

second surface 52 of package 50.

First surface 31 and side surfaces 33 of contacts 53 are covered with an encapsulant material. Second surface 32 and external side surface 55 of contacts 53 are not covered with encapsulant material.

Orthogonal external side surfaces 55 of contacts 53 of FIG. 8 were formed during Step 6 of FIG. 1 when the saw cut the connections between tabs 30 and members 23 and 23A of leadframe 20 of FIG. 2. Accordingly, the external side surface 55 of each contact 53 has a vertical profile which is the same plane as the corresponding vertical side 57 of package 50.

Although not shown in FIG. 8, the three internal side surfaces 33 (only one is shown) of each contact 53 have reentrant portions, as exemplified by FIGS. 3-6. In addition side surfaces 33 may have asperities, as exemplified by FIGS. 3-5. Both the reentrant portion(s) and asperities of contacts 53 enhance the connection between contacts 53 and encapsulant material 40 of package 50 of FIG. 8.

The perimeter of contacts 53 need not be substantially rectangular in shape. For example, if tabs 30 of leadframe 20 of FIG. 2 had a circular perimeter, then contacts 53 would have a largely circular perimeter with a rectilinear portion formed during the cutting of tab 30 from leadframe 20 in Step 6.

A bond wire 58 is connected between each bonding pad 56a of die 56 and the upper first surface 31 of each contact 53. Bond wire 58 electrically connects individual bonding pads 56a of die 56 to individual contacts 53.

Second surface 32 of contacts 53 of FIG. 8 may be directly connected to an external printed circuit board, as in an LCC package. Alternatively, a solder interconnection bump may be formed on contacts 53 for physically and

is in the same plane as lower second surface 52 of package 50 in FIG. 8, although in alternative embodiments, die pad 24 may be set up into encapsulant material 40.

Although not fully shown in FIG. 8, rectangular die pad 24 has four side surfaces 27 (only two are shown). Each side surface 27 of die pad 24 has a reentrant portion(s), as exemplified by FIGS. 3-6. In addition, side surface 27 may have asperities, as exemplified by FIGS. 3-5.

In FIG. 8, integrated circuit die 56 is on and attached to upper first surface 25 of die pad 24. Peripheral portions of upper first surface 25 are covered by encapsulant material 40. Side surfaces 27 of die pad 24 also are covered by encapsulant material 40. Lower second surface 26 of die pad 24 is not covered by encapsulant material 40, but rather is exposed at lower external surface 52 of package 50. In an alternative embodiment (not shown), die pad 24 may be entirely internal to encapsulant material 40 of package 50.

Two contacts 53 are shown in package 50 of FIG. 8, but since package 50 was constructed from leadframe 20 of FIG. 2, it should be understood that package 50 has a set of three contacts 53 on two sides 57 of package 50. In alternative embodiments, package 50 could be formed with a different number or arrangement of contacts, depending on the application.

Each contact 53 of FIG. 8 has a substantially rectangular perimeter and is located at the lower second surface 52 of package 50. Each contact 53 includes a planar or substantially planar upper first surface 31, an opposite planar or substantially planar second surface 32, three internal side surfaces 33 (only one is shown in FIG. 8) having reentrant portions, and one external orthogonal side surface 55. Second surface 32 of contact 53 is in the same plane as lower